approach

SEPTEMBER 1978 THE NAVAL AVIATION SAFETY REVIEW

HYPOXIA

The aviator's constant enemy

HYPOXIA: a deficiency of oxygen reaching the tissues of the body. Beyond this clinical definition lie many real life tales of blacked out pilots, emergency descents, and close calls resulting from oxygen deficiency in aircrews. In the past 5 years, Naval Safety Center statistics reveal 37 mishaps related to hypoxia. Although only one of the mishaps resulted in a documented accident and fatality, the nature of hypoxia is such that many accidents classified as "unknown" may very well have resulted from hypoxic aircrews. Also, it's probably safe to assume that additional hypoxic incidents have gone unreported. Clearly, oxygen and breathing problems pose a constant threat to naval aviators.

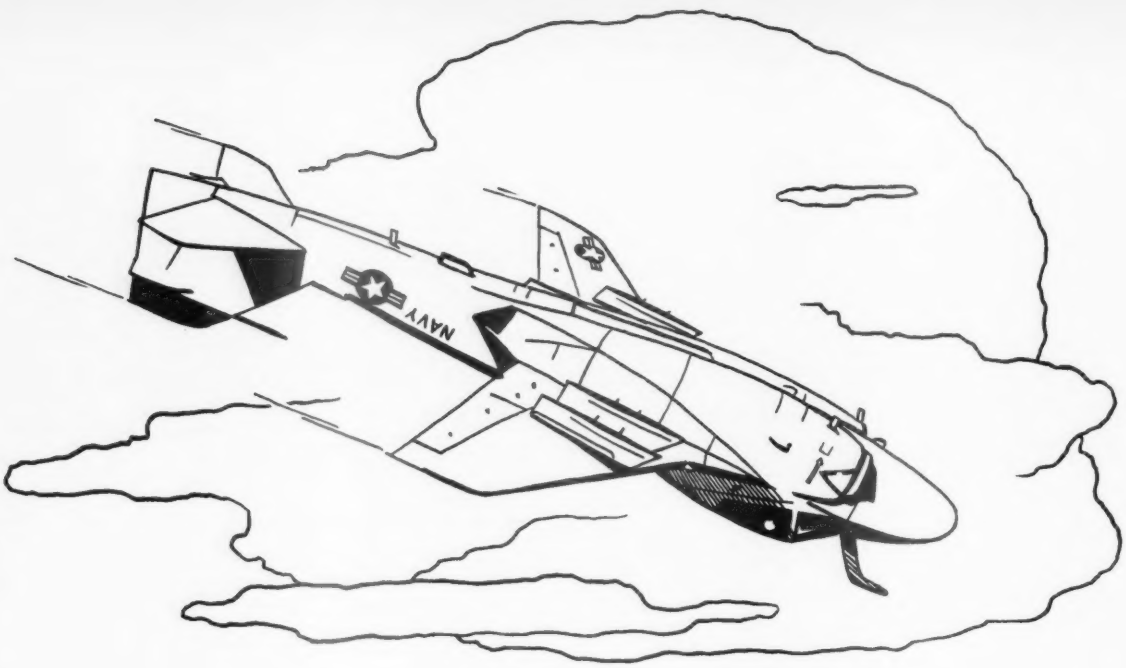
Hypoxia has been a lethal hazard since the beginning of powered flight, as even early aircraft and balloons had higher operational ceilings than the men aboard them. Engineering advances such as supplemental oxygen sources have been developed over the years, but the continued occurrence of hypoxic incidents suggests that the problem has yet to be solved.

There are actually four types of hypoxia: hypoxic hypoxia; anemic hypoxia; stagnant hypoxia, and histotoxic hypoxia. All of these will result in an insufficient supply of oxygen for the pilot's brain. Stagnant hypoxia is caused by circulation inadequacies which occur, for example, when a pilot pulls Gs. Anemic hypoxia results from reduced oxygen-carrying capacity of the blood and may be caused by blood loss, any of the anemias, or carbon monoxide poisoning. Histotoxic hypoxia results from some toxia interfering with cells' ability to use oxygen which is available. By far the most common type of hypoxia in aviators is hypoxic hypoxia which results from insufficient oxygen in the blood caused by reduced oxygen partial pressure at higher altitudes. Let's take a look at some actual incidents of hypoxia and see what caused them.

- Twenty minutes into an ACM engagement, an F-4 zoomed for altitude and was then observed in a 70-degree nosedown attitude in full afterburner. Panicky calls of "Pull up!" were heard over the UHF from the RIO, but they went unheeded. The aircraft crashed into the water, killing both occupants. The pilot was known to wear a lip mike in lieu of an oxygen mask, and he'd been seen in the Marshal area prior to the flight wearing a lip mike. This, plus an aircraft history of pressurization problems, led to the conclusion that hypoxia followed by unconsciousness was the probable cause of the accident.

- An A-6E pilot on an extended cross-country flight at FL310 found it necessary to use the relief tube. He removed his mask and secured the oxygen switch due to the difficulty of using the relief tube while wearing the mask. After a considerable time, the B/N noted the pilot was having trouble stowing the relief tube and helped him. The pilot then replaced his mask, but neglected to turn the oxygen back on. Shortly thereafter, the B/N noted that the pilot had passed out. He disconnected the autopilot, pushed over the aircraft, and declared an emergency. Passing 18,000 feet the pilot recovered. Later investigation revealed a faulty cabin pressure regulator which resulted in a higher cabin altitude than would normally have been the case.

- Hypoxia emergencies are not limited to jets. During a simulated bailout drill in a P-3C at 18,000 feet, the cockpit suddenly depressurized. Several crewmembers experienced



hypoxia before they could put on oxygen masks. Investigation revealed the flight engineer had depressurized the cabin accidentally as an overreaction to the simulated bailout drill.

• The pilot of an A-7B experienced difficulty in exhaling through his oxygen mask, so he loosened it in order to exhale around the seal. After 45 minutes of flight at 18,000 feet, he climbed to 40,000 feet to complete the maintenance checkflight. Approximately 2 minutes after level-off, the pilot experienced hypoxia symptoms. A glance at the cabin altitude gage revealed that actual cabin altitude was increasing through 36,000 feet. The pilot immediately descended and recovered at Homefield uneventfully. The exhalation problems were due to foreign particles in his mask. The canopy seal was also faulty, resulting in improper pressurization. The combination of lost cabin pressure and loosely fitted mask resulted in hypoxia to the pilot.

A summary of 5 years of hypoxia incidents reveals the following breakdown of cause factors:

Mask/regulator/oxygen system failures or malfunctions: 17
Loss of cabin pressurization: 10
Voluntary removal of mask: 6
Improper mask fit: 5
Contaminated LOX/improper LOX servicing: 3
Miscellaneous other: 1 (aircrew physical condition)

Those mathematicians reading the article will note that the total incidents referenced above exceed the total 37 incidents mentioned earlier in the article. This is because there were often several factors that led to a hypoxic incident. The two factors that most frequently combined to produce hypoxia were a faulty pressurization system in conjunction with a loosely fitted or not worn mask.

The naval aviator of today has three safeguards against unconsciousness due to hypoxia: cabin pressurization, supplemental oxygen, and physiology training in the detection of hypoxia symptoms. As can be seen from the table of hypoxic incidents, the first two hypoxia preventive devices have been less than foolproof. That leaves detection of hypoxia and immediate corrective action as one of the most important ways an aviator can avoid an accident due to hypoxia.

Every aviator goes through physiology/low pressure chamber training every 3 years, and it has probably saved many lives. But it, too, is not foolproof. This is true because the onset of hypoxia varies with the cause. The training done in the low pressure chamber demonstrates clear-cut, progressive, and almost unmistakable symptoms of hypoxia. In other situations, however, the symptoms may not be so clear. For instance, a leaky mask or hose connection will "dilute" breathing oxygen with cabin air. This will set the stage for hypoxia, but the amount of hypoxia will vary from one breath to the next depending on factors such as leakage rate, altitude and body position (which may affect the magnitude of the leak). This type of hypoxia can be difficult to trace. It can also be very dangerous since it may be disregarded in the early stages due to the lack of strong hypoxia symptoms such as the

pilot experienced in the low pressure chamber.

The insidious nature of hypoxia makes it critical that you are able to recognize the symptoms of hypoxia at all stages of progression. The first symptoms are typically increased fatigue, irritability, onset of headache, and a decrease in judgment. As hypoxia progresses, you will become dizzy, lightheaded, sometimes euphoric and sleepy. If no preventive action is taken at this point, you can expect to lose muscle coordination, your speech will become slurred, nails turn blue, and your thought processes will slow. Finally, unconsciousness takes over.

How long does this process take? Ask the average naval aviator and he will probably say, "Oh, 1 to 2 minutes," based on his experience in the low pressure chamber. Well, the truth is, your "useful conscious time" varies widely, based on several circumstances. As mentioned earlier, if the problem is merely a leak and you are flying in a normally operating pressurized cabin, the hypoxia symptoms may never progress beyond the initial stage. On the other hand, if your mask is off and you experience sudden cockpit depressurization at 40,000 feet, you could be unconscious in 18 to 30 seconds. Figure 1 (taken from the *U. S. Naval Flight Surgeon's Manual*) gives useful conscious times at various altitudes:

Time of Useful Consciousness

Altitude (1000 feet)	Rapid Disconnect (moderate activity)	Rapid Disconnect (sitting quietly)
22	5 min	10 min
25	2 min	3 min
28	1 min	1 min 30 sec
30	45 sec	1 min 15 sec
35	30 sec	45 sec
40	18 sec	30 sec
65	12 sec	12 sec

(Carlyle, 1963)

Fig. 1

How does an aviator avoid the potentially disastrous effects of hypoxia? By monitoring cabin pressurization and altitude, by conforming to his aircraft's NATOPS policy concerning oxygen masks, and by being familiar with the symptoms of hypoxia. If hypoxia is encountered or suspected, the aircrew should 1) Put on the oxygen mask securely (and go to 100 percent oxygen if the regulator is the diluter-demand type); 2) Check cabin altitude and pressurization switch; and 3) Descend to an altitude equivalent to 10,000 feet cabin altitude or lower. While this sounds straightforward and relatively simple on paper, one of the dangerous aspects of hypoxia is that one of its initial characteristics is impairment of judgment. Thus an aviator may be tempted to disregard early symptoms or he may take inappropriate action such as removal of his mask. Also, as noted earlier, at extremely high altitudes, unconsciousness may be the first symptom of hypoxia.

Although most common in high-flying tactical jet aircraft, hypoxia is not limited to these aircraft. Hypoxia can be experienced in any aircraft that flies over 10,000 feet. Figure 2 gives a breakdown of aircraft types involved in the 37 hypoxic incidents related in the study.

Aircraft Types Involved in Hypoxic Incidents

F-4	8
A-6	5
A-7	5
A-4	5
AV-8	3
T-28	3
P-3	3
F-8	1
T-2	1
KC-130	1
E-2	1
A-3	1

Fig. 2

In any aircraft, the most important factor in avoiding hypoxia is to wear the oxygen mask as directed. General NATOPS requires that tactical and training jet aircrews use oxygen routinely from takeoff to landing. For pressurized multipiloted nontactical aircraft that can maintain a cabin altitude below 10,000 feet, OPNAV 3710 provides a table which governs the use of oxygen equipment according to ambient altitude. The importance of adhering to oxygen use requirements is validated every year by the number of aviators who suffer from hypoxia because they were not wearing their masks when they should have been.

Okay, you *should* wear your mask when prescribed by NATOPS, and it is the best insurance you have against hypoxia. Now, let's be realistic. Aviators *do* remove their masks, and they *do not* always wear them in accordance

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with the instructions. Why? Discomfort and impairment in performing cockpit duties are big factors. In one situation, an A-6 B/N removed his mask because it got in his way as he tried to reset some popped circuit breakers. The aircraft climbed to FL290, where the pilot noticed the B/N slumped over and passed out. A rapid descent to lower altitude revived the B/N. The circuit breaker he was trying to reset was the one that controlled cabin pressurization.

Aviator complaints about the current A-13A Navy oxygen mask have been many and well documented (see "The Pilot's Dilemma," JUN '77 APPROACH). Help is on the way, however. A new generation of oxygen mask is being developed and has completed evaluation at VF-121. (Articles concerning the new mask appear in this issue.)

Beyond the discomfort factor, there are other reasons aviators remove their masks when they are supposed to be wearing them. Suspected LOX contamination, sniff-checking fumes in the cockpit, talking with other crewmembers when the ICS fails, mask inhalation or exhalation problems, cabin altitude stabilized below 10,000 feet (in tactical aircraft) – all these have been cited as reasons for mask removal. And they all have been cited as factors in the onset of hypoxia. Let's look at why removing the mask in violation of OPNAV 3710.7H is rarely ever justified.

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- True LOX contamination is extremely rare. Occasionally, some impurities in the LOX manufacturing process will impart an odor to the oxygen the pilot breathes, but this does not necessarily make it toxic. Removing the mask is a sure way to start the hypoxia process. A better procedure is to keep the mask on and assess the situation. If continued breathing results in nausea or some other symptoms, activate the seat pan emergency oxygen, secure the aircraft supply, descend to a cabin altitude below 10,000 feet, and then remove the mask.
- It is dangerous to remove the mask at high altitudes and try to shout between crewmembers in the event of ICS failure. Sound waves carry poorly at high altitudes, and you are setting the stage for rapid onset of hypoxia.
- In the current A-13 oxygen mask, exhalation problems are almost always due to inhalation valve malfunctions such as the valve being stuck open due to a particle of dirt. If this happens, exhaled air exits through the inhalation valve and exerts pressure on the rear of the exhalation valve. This pressure prevents movement of the exhalation valve, regardless of how hard the aviator exhales, because the pressures are exactly equal on both sides of the flapper valve. An aviator faced with this dilemma will usually remove his mask – and risk hypoxia. What he should do instead is work his jaw in such a way that he can vent the exhaled air past his chin and out the bottom of the mask.
- Just because the cabin altitude is below 10,000 feet, there is no absolute guarantee that the aircrew will be immune to hypoxia. Physical condition and well-being are important factors in resistin the effects of hypoxia. There is at least one documented case of an aircrewman in a multiengine aircraft passing out from hypoxia even though the cabin altitude never exceeded 10,000 feet. He had had little food or sleep over the past 2 days and had indulged in alcohol. Had this occurred to the pilot of a single-piloted aircraft, the consequences would have been obvious.

If, after reading all this, you still are determined to remove your mask in flight in violation of the instructions, at least consider the following: 1) Check cabin altitude before removing the mask; 2) Don't completely disconnect the mask – leave it attached by one clip so it will be close at hand in an emergency; 3) If you are planning to remove the mask only temporarily, leave the oxygen flow on. If you become hypoxic, you may not be able to locate the switch to turn it back on.

Unfortunately, there are no forthcoming revolutionary breakthroughs in equipment that will make every aviator immune from hypoxic incidents. As mentioned earlier, a new mask is coming which should improve comfort and decrease interference with cockpit duties. Beyond that, there have been suggestions made to incorporate warning devices in the cockpit to alert the crew to pressurization failures. Since most hypoxic situations occur in conjunction with a failed or faulty cabin pressurization system, this seems like a good idea.

Ultimately, though, the education and training of the aviators concerning hypoxia is the best way to avoid hypoxic incidents. The less often a tactical pilot removes his mask, the less likely he is to get hypoxia. The more all pilots know about their mask, their oxygen system, and hypoxia, the more likely they are to respond correctly to hypoxia situations. And the more familiar the naval aviator is with hypoxic symptoms, the quicker he will be able to take corrective action. Very few emergencies in naval aviation require quicker identification, analysis, and reaction than hypoxia. Are you as well prepared to deal with hypoxic emergencies as you are with other inflight emergencies? ◄

Correction: The article "An Unbroken Chain" appearing in the JUN '78 APPROACH contained an incorrect byline. The author was Capt J. R. Sandberg, USMC, VX-4.

POOR PLANNING

A CH-46 had aborted a noon flight aboard an LPH due to the failure of the No. 1 starter to drop off after engine start. This also caused a low utility pressure indication and prevented No. 2 engine start.

Troubleshooters worked on the problem for 7 hours, and about 1900 they thought it was corrected. A turnup was requested to confirm the problem was solved. Two pilots were assigned, and they covered the checklist for engine start. Number 1 engine was started, but again the starter did not cut off.

Hydraulic troubleshooters prepared once more to do their thing, including to look for leaks in the system. The senior man wanted to isolate the No. 1 starter from the system. He told the crew chief to disconnect the starter hydraulic lines while he observed the cockpit gages.

The CH-46 was configured with the EAPS (engine air particle separator) system, so the starter pressure and return line quick-disconnect fittings were located under the EAPS access panel – outside the aircraft. The crew chief told the pilot he was going to disconnect the No. 1 engine starter lines.

The crew chief proceeded with his work and disconnected the return line which was easily accessible. With the starter turning and no place to vent the pressure, the base plate blew off and hydraulic fluid was pumped into the engine. The pilot heard the noise when the starter ruptured, and secured the No. 1 engine condition lever. The copilot saw the No. 1 T5 gage climb through 900 degrees.

The crew chief told the pilot that flames were coming out of the engine exhaust, and the pilot put the condition lever in the crank position. He wanted to blow the fire through. This did not do the job, so the pilot moved the condition lever to idle cutoff. The No. 1 engine firewarning light illuminated, the copilot pulled the fire handle, and the agent bottle was discharged. The fire light went out, but the APP firewarning light came on. The T5 gage didn't show any signs of cooling, so the pilot ordered everyone out of the helicopter and secured all switches.

The hand-held fire extinguishers were discharged but didn't put the fire out. However, the fire was extinguished with light water from a TAU tractor which was alongside the helicopter.

An investigation revealed the helo had sustained heat damage to the aft pylon behind No. 1 engine exhaust. The

No. 1 engine starter had ruptured at the base plate. The No. 1 engine had damage to the first stage compressor due to starter FOD and heat. P&E inspections estimated over 300 man-hours and over 2 weeks time to repair the aircraft.

The senior troubleshooter didn't disconnect the electrical cannon plug for the starter, and didn't tell the crew chief which line to disconnect first. The senior troubleshooter should have known the consequences of disconnecting the return line to a pressurized starter. The crew chief should have been more knowledgeable of the system and should not have disconnected the return line.

It is probable that they were frustrated from the long hours they had been working on the problem, and they could have been rushing toward the end to get it over. One thing for sure, *proper and thorough maintenance procedures cannot be ignored for the sake of expediency* – or any other reason. ◀

Know Your Aircraft. An F-4 replacement pilot and replacement RIO returned from a bombing sortie. Their aircraft was configured with centerline tank, two wing pylons (each with TERs), two LAUs, and launcher. They broke second in their section and lined up in the groove on the left side of the runway. They touched down on speed with a normal sink rate about 1000 feet from the approach end.

The drag chute was deployed, but the aircraft began a starboard drift. The pilot suspected a blown starboard tire and countered the drift with left rudder and brake. The aircraft crossed the arresting wire, 2300 feet from the approach end, and the starboard wheel assembly severed the pendant. Tire marks showed the port tire blew about 500 feet farther down the runway, and the F-4 departed the runway at 3100 feet from the approach end.

The pilot engaged nosewheel steering after the aircraft left the runway. The aircraft traveled 45 feet laterally before the pilot regained directional control. The *Phantom* then returned to the concrete and stopped 4600 feet from the approach end.

The cause of the starboard tire malfunction was unknown. The runway was swept immediately after and removed any evidence which may have led to finding what caused the blown tire. Most probable cause for departing the runway was the pilot's failure to engage nosewheel steering earlier in the evolution.

The pilot was transitioning to the F-4. He was an experienced A-4 instructor and was very conscious of the A-4's unstable ground handling characteristics. He had personally seen a TA-4 overturn at high speed due to a malfunctioning nosewheel steering system.

With this background, he was reluctant to use the F-4's nosewheel steering. He *now* knows the merits of the F-4 nosewheel steering system to assist in directional control.

Any time pilots are being introduced to a new series or new type aircraft, the command should incorporate in the familiarization stage lectures on the peculiarities of the new bird. Each type aircraft has its own idiosyncrasies, and they should be emphasized.

Well Done. During his first practice night autorotation to the duty runway at Whiting (south), the UH-1L engine failed to respond to power application in the flare. The autorotation was continued to the deck, and an uneventful landing ensued.

Local investigation revealed minor FOD to the engine. Any engine failure and the subsequent autorotation demands immediate and correct response. Good on ya, LT Thomas L. Freeland, for your keen diagnosis and flawless execution of an emergency landing.

Propwash Damage. A P-3 pilot landed at a municipal airport on a stopover flight plan. The aircraft taxied to the FBO (Fixed Base Operator) line to discharge passengers and cargo. The No. 1 and No. 4 engines were secured before reaching the general line area.

The taxi director gave a signal to the P-3 pilot to make a 180 turn and then gave a stop signal. The No. 2 engine was shut down, and a couple of the crew disembarked. Shortly afterward the flight engineer, who had left the aircraft, signaled the pilot to come ahead. The third pilot entered the cockpit and announced that the *Orion* appeared to be sinking into the asphalt.

Power was added on No. 3 engine and the aircraft moved forward about 4 feet. Then the signal was given to stop by the flight engineer. Number 3 engine was shut down. The aircraft

commander exited the aircraft and was informed by the FBO's linemen that a *Beechcraft*, parked aft, had been damaged by the P-3 propwash.

The aircraft commander verified the *Beech* had been damaged slightly. The P-3 propwash caused the *Beech* tail control surfaces to flutter, resulting in broken trim tab cables and some damage to the tail control surfaces. The *Beech* gust lock had not been set and the broken cables showed evidence of severe corrosion.

All military pilots, when maneuvering in civilian line areas, must be super cautious when using power to avoid damaging light aircraft with propwash.

No Contact. The HAC and his crew were scheduled to transport passengers from the beach to the ship in their CH-46D. It was necessary to make two trips to transport all of the passengers, and the ship was opening away from port.

The first trip was uneventful and the helicopter returned for the second load. While on the deck, the helo was refueled, passengers loaded aboard, and they departed for the ship with 1000 pounds of fuel per side.

When they launched the second time, the ship was approximately 50 miles at sea, making 15 knots. En route, the crew ran into numerous rain showers which they flew around to maintain VFR. Initial voice contact with the ship indicated it was in the middle of a rain shower and expected it would be 10-15 minutes before the ship steamed into the clear.

The HAC was unable to get a reliable TACAN or UHF steer to the ship, but kept on flying toward its last position. Intermittent voice contact with the ship revealed it was still in the rain shower, and the ship reported it was unable to pick up the helo on radar. The HAC continued to search for the ship until all radio contact was lost.

When he no longer had voice contact, the HAC decided to stop looking for the ship and headed for the nearest point of land. He was able to talk to one or two other aircraft on Guard and relayed his intentions. The HAC intercepted the coast and made an immediate landing on the beach with 150 pounds of fuel per side. Later, some go-juice was VERTREPed to him, and after refueling, the pilot returned safely to the ship with his passengers. This HAC deserves a pat on the back for diverting in time to land safely and for his heads-up appraisal of the situation.

Cargo Hazard. A Marine KC-130F took off at dusk in weather which was barely above minimums for sea gulls. Officially, the weather was reported as partial obscuration, 1700 broken/6000 overcast, visibility 1 to 1½ miles, rain and fog, no spread, and winds were calm.

After takeoff, the aircraft was pressurized and a strong odor of fuel fumes spread throughout the aircraft. The crew immediately went on 100 percent oxygen, depressurized, carried out NATOPS smoke and fuel elimination procedures, and declared an emergency. They were vectored back to their departure point and landed.

Investigation revealed that part of their cargo load consisting of 10 boxes weighing 5200 pounds (439 cubic feet) had been crated by the originating unit. The boxes then had been transported to the base terminal for proper packaging, preservation, inspection, and documentation before being airlifted.

The sender attested that the boxes contained no hazardous material and the boxes were not inspected.(?) Subsequently, the boxes were loaded aboard the KC-130F for shipment. After the aircraft returned to base, the boxes were off-loaded and opened. They contained a complete helicopter expedient refueling system which had not been purged and still contained residual fuel.

It was fortunate that there were no passengers aboard, for it is likely they would have been overcome by the high concentration of fumes. The crew was also lucky because a spark could have turned the aircraft into an exploding, flaming coffin.

Personnel of activities charged with the responsibility for weighing, packaging, preserving, inspecting, and documenting air shipments *MUST* follow procedures completely. The safety of the crews and aircraft hauling cargo is literally in your hands! ◄

At last!
A comfortable oxygen mask

By LT W. Zander
VF-121

The MBU-12/P (left) offers reduced size and weight.

The lower profile of the MBU-12/P (right) increases field of view.

THOSE aviators who fly in hot, humid climates, in ACM, or for any period longer than 10 minutes know the value of a properly fitted lightweight oxygen mask. After years of struggling and sweating with the relatively heavy and large A-13/A Navy oxygen mask, relief may be in sight. Operational evaluation (opeval) of the MBU-12/P oxygen mask was completed on 28 February 1978, and the data is being collected and analyzed.

After wearing the mask and talking with many pilots and NFOs who participated in the evaluation, it is felt that the MBU-12/P will be a welcomed addition to one's flight gear inventory. Not that the A-13/A doesn't do the job according to required performance, but most aviators who fly with it will agree that improvements can be made.

The MBU-12/P combines the most desirable qualities of comfort and visibility with the required performance of a positive face seal for pressure breathing, ejection, decompression, and the ACM environment. The mask is a lightweight, single-piece face cup attached to a flexible oxygen hose with standard regulator and lower hose assembly. The electrical system, as used in the operational evaluation, was similar to existing Air Force helmet cord and microphone systems. However, there are expected changes in the mask's communications configuration prior to approval for service use.

The outstanding features of this mask are its fit and light weight. The face cup design uses a different approach than the A-13/A. The A-13/A uses a soft face mask in a hard cup. The MBU-12/P employs a single-piece mask with rigid lower portion and pliable silicone upper section. With a proper fit, it does not tend to slide down under high G loading. The entire facepiece is of low profile design providing an increased field of view requiring less head movement for normal instrument scan. The microphone is recessed away from the wearer's mouth, which keeps it from cutting into the lower lip during high G flight. An extension modification is being considered for those who like the mike closer. The contoured fit is superb, and there is less silicone material to make facial contact.

A flexible oxygen hose of lightweight construction provides little resistance to head movement. Any "air pump effect," causing resistance to exhalation created when the soft hose is extended and compressed, is minimized through a modification, preventing hyperextension of the hose.

The MBU-12/P was worn in one actual ejection during the opeval. It provided a watertight seal, in heavy seas, when the NFO initially entered the water and during at least one subsequent dunking. His postejection opinion of the mask is very high.

At first glance, the MBU-12/P is a huge step in the direction toward improved performance and more comfortable flight gear. Final results and conclusions from the opeval should be interesting information for all oxygen mask users.

The MBU-12/P: Part of the system

By LCDR John A. VanDevender
Fleet Liaison Officer for Crew Equipment
Naval Air Development Center

LT Zander's article detailing his favorable impression of the MBU-12/P oxygen mask is most appreciated by the engineering staff at the NAVAIRDEVCEN. The need for a new mask has long been recognized, but the effort to produce one has only recently been accelerated. The MBU-12/P should act as a very good *interim* solution to current problems until the HGU-35/P helmet with its integrated oxygen system arrives.

The primary problems with the A-13/A oxygen mask (to differ slightly with LT Zander) were not the poor fit or even the weight, although that is not meant to indicate those problems were insignificant. The facets which caused the A-13/A mask to be unsatisfactory were the means of attachment to the helmet (butterfly clips) and the cup holder of the mask. The butterfly attachment caused the helmet to rotate aft when cinched tightly to the face, creating a gap between the visor and the mask. Under G loads, the pivot line being well under the helmet CG caused a forward rotation of the helmet due to the forward CG of the mask. How often during ACM has the pilot had to support the mask with one hand while flying with the other? The MBU-12/P uses offset bayonets which move the pivot arm much closer to the helmet CG. When cinched tightly, the helmet does not rotate aft, and under G, has a much-reduced tendency to rotate forward (in fact, if the helmet is formfitted, it will not rotate at all!). The lighter weight of the MBU-12/P and its reduced profile also contribute to the desirability of the mask.

The MBU-12/P program is being expedited through the maze of RDT&E procedures by the efforts and support of the CNO representative for Aviation Life Support Systems (OP-50C). It now appears that it will become available for fleet introduction concurrently with the HGU-33/P lightweight, formfit helmet, and the two will be issued as a system. The MBU-12/P will *not* be interchangeable with the A-13/A. The lightweight HGU-33/P will very effectively solve current helmet problems due to its very stable, comfortable fit. It was ascertained by the pilots involved in continuous ACM at the ACEVAL/AIMVAL exercises at Nellis AFB that proper fit of the helmet is more critical than weight in determining the performance of a helmet.

The HGU-35/P helmet and oxygen system.

My own experience flying a formfitted APH-6 confirms their opinion.

The new helmet-mask system should be arriving in the fleet in late 1979 or early 1980 if the present pace is maintained; if delays in procurement funding arise, it could be delayed another year. In the interval, it should be noted that APH-6 helmets have been demonstrated to be very comfortable when formfitted, and the current A-13/A mask shows a substantial improvement in performance when equipped with offset bayonets. The fleet has several formfitting stations scattered throughout the nation for use of the VTAS (visual target acquisition system) equipped fighter squadrons, and offset bayonets are items of Air Force supply although plans are being formulated to convert present butterfly fittings to these bayonets.

If any questions arise concerning the helmets and masks, the NADC Crew Equipment Liaison Officer (Autovon 441-2847) will be happy to answer them.

Admiral's Corner

How's it going, Doc?

WHEN is the last time you asked this question of your flight surgeon?

From my vantage point here at the Naval Safety Center, I have become concerned about the number of physical and psychological problems uncovered during accident investigations that were not known to the command prior to the accident. We all agree, I'm sure, that part of the "command" function should be that the commanding officer have knowledge of his aircrews' physical and psychological well-being. Optimum use of the expertise afforded by the flight surgeon is one way of getting at this problem. The other is to ensure that the command attitude is clearly stated.

For example, a recent MOR reflected that the pilot had gone to sick call on three consecutive days and was seen by three different physicians for three different complaints. On the fourth day, he was involved in a fatal mishap. *No one* in the command knew that he had gone to sick call! The obvious questions arose when the mishap board's report came in. Why didn't the command know? Was he physically qualified for flight on the day of the mishap?

In a second example, the mishap board learned that the pilot had been seeking psychiatric help. It was also learned that the results of a test given him revealed that he was *not psychologically fit for flight.*

10 Clearly, we need to do better in getting our flight surgeons and the command working as a team *before the fact* and thereby not have surprises surface as a result of mishap board proceedings.

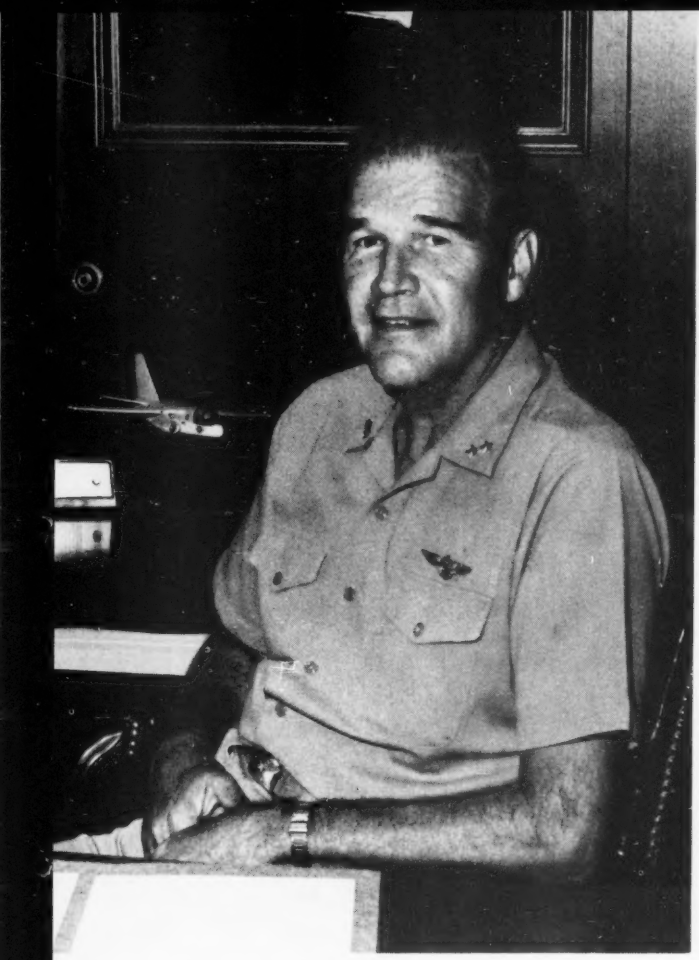
It is recognized that there is a shortage of flight surgeons available for assignment to aviation units. Notwithstanding this fact, I believe we must place the flight surgeon back into the loop of "aircrew surveillance." It is also recognized that there are competitive demands for the flight surgeon's services between the dispensary and the squadron. I do feel, however, that we can do better. We must do better!

If we accept aircrew surveillance to mean observation and perception of readiness in flightcrews, we can logically consider surveillance as a bipolar problem. One pole is the physical and emotional state of the aircrewman. The other pole is the professional performance of the aircrew which encompasses elements of knowledge, skill, experience, motivation, reliability and suitability for the mission at hand.

If we have a crewman who has an infection, an injury, or another disability, which may be alone or combined with the effect of therapeutic drugs, the result is likely to compromise the crewman's readiness for flight. Yet we find cases in which aircrewmen under treatment are retained in a flying status and are not appropriately grounded.

How long has it been since you looked at the administrative procedures between your flight surgeon, sick call records, and your schedules officer or Operations department? Do you put people on the flight schedule without determining whether they are under medical treatment and are, in fact, grounded? Do your aircrewmen push themselves too far when they don't feel well?

I believe that commanding officers are fully aware of their responsibility with respect to the



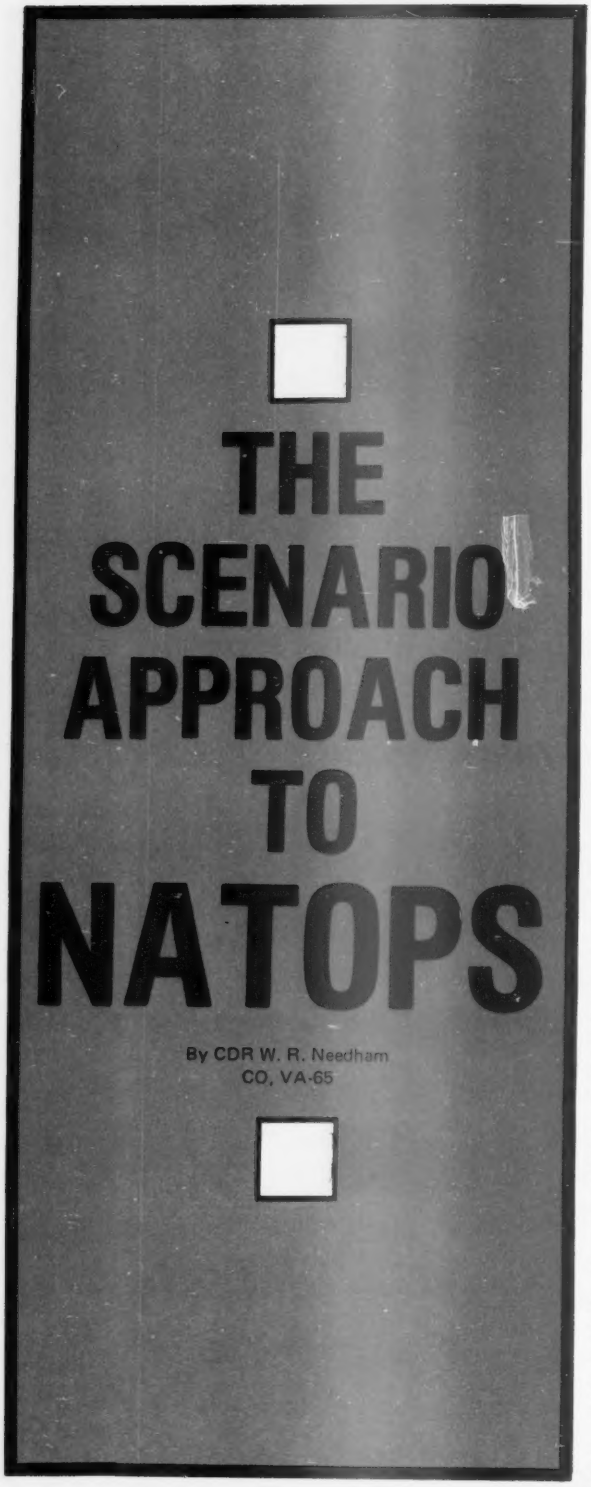
knowledge and skill of their crewmembers to perform any assigned flight duty. Conversely, I am led to believe that maybe we do not understand in sufficient detail those physical and psychological aspects of aircrew well-being which make aircrews temporarily ill-suited for flying duties. You in command also must establish the attitude with your pilots and aircrewmen that there is no implication of "not being able to hack it" if a man is temporarily disabled as a result of cold or minor infection or sprained knee from the racket ball court or whatever.

Command responsibility must cover not only the aircrews' technical skills and knowledge, but their physical well-being. The role that the flight surgeon plays in assisting you in this determination needs to be reinforced.

I recognize that this aircrew surveillance problem is a gray area that almost imperceptively arises from the physical/emotional status of the aircrewmember and merges with his professional performance. But it is nonetheless an important aspect of ensuring that our aircraft mishaps are not a function of physical and emotional status. It is my view that these considerations are inextricably interwoven and that they can only be adequately understood when you as the commanding officer extend your effectiveness and perception by asking the question, "How's it going, Doc?"

F. P. Glindeman Jr.

Commander, Naval Safety Center



THE SCENARIO APPROACH TO NATOPS

By CDR W. R. Needham
CO, VA-65

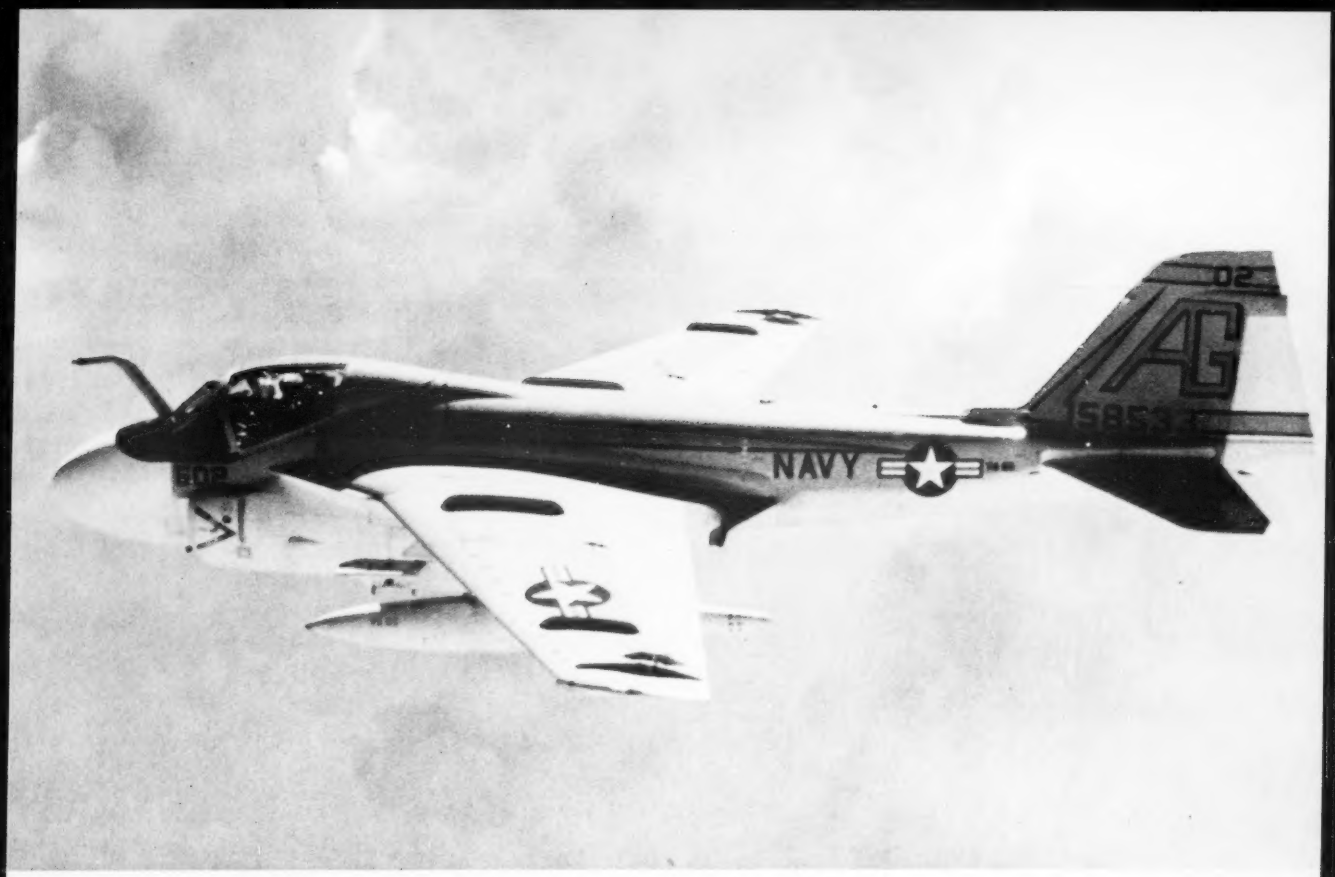
IF your squadron isn't using the scenario approach to NATOPS, you are missing a golden opportunity to enhance the training and the overall readiness of your flightcrews. The scenario approach is designed as a means of developing a more rational/logical response to a problem rather than a "By Rote" response to an aircraft emergency.

Everyone involved in aviation can remember hair-raising accounts of a crew who seemed destined to auger in somewhere. But through the use of logic, they managed to pool a wealth of experience and judgment to bring 'er back to fly again. These stories make an indelible impression on all who encounter them, although some walk away shaking their heads in amazement. Most aviators, however, analyze the set of circumstances in their own minds in hopes of identifying the key which prevented (or caused) the incident in case they are ever in the same situation. How did they know just what to do? Were they previously faced with a similar problem? You have surely recognized by now that NATOPS doesn't cover every situation; so what process is involved in successfully coping with a nonstandard emergency? Aren't they all (nonstandard)?!

Obviously, the answer is advance preparation. This includes more than strict adherence to steps in the emergency section of a pocket checklist and memorization of facts and figures to the last decimal point. The aircrew must be able to fully recognize the unique hazards of their particular flying environment or else they may end up as another accident statistic.

No earth-shattering revelations thus far, but how is this philosophy of combining knowledge of your aircraft and good headwork – which is fostered from your first day in the training command – translated into a NATOPS training program at the squadron level? Simple! You have to develop a challenging program which analyzes a situation, develops alternatives, tests these alternate courses of action, and views the possible results of each action. Basically, the approach boils down to: "Here's what you are looking at; here's your problem; now what are you going to do about it?" You have to put the aircrews into a scenario that requires them to use their experience and judgment; a program designed to build the confidence that they can handle a problem if they are prepared and have covered the possibilities in advance.

For example, here's a scenario involving a night launch from the ship into deteriorating weather conditions. You plan your fuel to trap at max recommended arresting weight. All of a sudden you hear, "Delta 12." Those ahead of you are having trouble getting aboard! You recompute your fuel and find that there is still no problem as long as this delta business doesn't get out of hand. Finally, you push out of Marshal but are waved off for separation. As you come around for the next approach, your flaps and



slats fail to come down by normal or emergency means. (At this point, inject questions concerning possible popped circuit breakers, availability of extended flight controls, aircraft configuration, airspeed, and AOA for a no-flap/slat landing.) You're all set up for a no-flap/no-slat landing. The LSO waves you off due to insufficient wind across the deck. (Now the crew must consider fuel, tanker status divert facilities, and weather.)

To add credibility to the scenario, all the conditions should be predicated upon current operational procedures, and theater of operation. Make it real! The source material for most of the scenarios may be found easily by reviewing the incident and mishap reports which you receive by message and may be "doctored" as needed to make things interesting. Squadron NATOPS officers must be responsible to ensure that maximum planning is undertaken so that each scenario is clearly written and all necessary cockpit indications are provided (along with a few extraneous items to weed out the amateurs – hopefully, none!).

The set of circumstances should provide a limited number of acceptable alternatives, yet afford the opportunity to solve the problem. Don't make your first attempt at a scenario so involved that you are unable to provide the correct guidance. You must thwart attempts to inject more "what if's" by the participants if the questions raised are not pertinent to the discussion. For this reason, keep the first few scenarios simple and then build in complexity as you become more accustomed to their development. Let the truly experienced aircrews add to the conclusions of a group discussion, but avoid allowing them to dominate.

Shoot for max participation. It is a basic fact that there are many valuable lessons to be learned from those who have been there and those who have greater aviation experience. All aircrews will benefit by sharing their opinions with others in a discussion of how to handle an airborne emergency when considering all the possible variables.

The scenario approach to NATOPS is therefore a means of stimulating the aircrews' natural desire to learn more about their aircraft while at the same time gaining greater exposure to the entire flying environment. The aircrew should learn to expect the unexpected as a rule, not as an exception. They should receive continuous reinforcement as to the value of good headwork and the ability to routinely consider all possibilities.

Through the scenario approach, aircrews will quickly learn that managing a real-world emergency takes more than following the pocket checklist to bring 'er back to fly again. ◄

Have you ever been on a checkflight and when a malfunction occurred, your first reaction was to wonder how or if the checkpilot caused it? If the answer is "yes," then you were guilty of . . .

That insidious second guess

By LTJG Michael Pocalyko

AN old pilot once insisted to me that the most dangerous and debilitating elements of aviation are also its most subtle points – its **gotchas**. Which is why, he explained, I must always guard against encroaching complacency, be wholly aware of my state of mind when I fly, and know my own limitations as well as I do my aircraft's. That is, if I want to become an old pilot, too.

I step back a few months and find that I am faced with a checkride. It follows the well-standardized syllabus of instruction in an H-3 fleet replacement squadron. I have completed the instructional hops and feel prepared for this checkflight, my crew has been briefed, and so has the aircraft commander. I have flown with this HAC before; the two of us are comfortable together and professional in the air. And already I've made a few points – he's complimented me on a good NATOPS brief. A complete preflight inspection is unnecessary for us because we are part of a hot-seat evolution on the flight line.

Once strapped in, I am confident in myself and certainly not complacent. I've answered the questions on the aircraft systems and come up with the right numbers for all the red lines and RPMs. We systematically follow the checklist, challenge-reply.

The HAC calls "Servo sensor," and because the rotor blades are spread, I say, "Safety, Master" as I reach for the blade fold panel, opening the safety valve switch and turning on the blade fold master switch. I verbally note a drop to zero on the primary servo hydraulic pressure gage and a PRI SERVO PRESS caution light. The master caution light is reset, and I cannot secure the AUX pressure with the servo switch on the collective. Good. Again I say "Safety, Master" and close both switches. Primary pressure

stays at zero; no rise – and there certainly should be one.

The checkpilot is testing me now, I am sure. This same thing has happened before. It is a matter of a circuit breaker pulled to check my reaction. I report what I see and begin to ask the HAC (as copilot) to check the circuit breaker in, but I also notice the plane captain. He is pounding on the front windshield and pointing to the right side of the helicopter. I turn right, see a wall of hydraulic red, and find that my hand is beaten to the speed selector by the HAC, who secures the engine and shuts the aircraft down.

We postflight, examining the bird for our incident report, and the plane captain watches me as I look at the helo from a respectful distance, shaking my head. "Gee, sir, she really bled to death, didn't she? I've never seen anything like **that.**" And I answer him, "Neither have I." It is the truth.

What happened to me amounted to a ground incident involving a blown primary hydraulic line which ruptured from a surge of pressure (when the blade fold master switch was turned back on). But behind the incident was a lesson learned that harbors a message for all Navy and Marine Corps aviators, regardless of age or experience.

That insidious second guess caught me. It wasn't a simulated malfunction initiated by the checkpilot. And it was not complacency, but a subliminal idea I must have had that because I was to fly a checkride, I not only had to fly ahead of the aircraft, but also had to think ahead of the instructor pilot. Never before had I considered my checkflight performance in those terms, but they are valid nonetheless.

It would be easy enough to chalk up my mind's first reaction in this situation to my relative inexperience, my zeal to do particularly well on the flight, or even to what my second-tour teachers call "knowing just enough to be dangerous." That justification would be simple, but it is not what this self-examination is about. We as naval aviators are part of a business where the checkflight is an ongoing part of our shared life. This is true for flight students, for transitioning pilots and NFOs, for squadron personnel involved with continuing proficiency training, or NATOPS evaluation, or the annual instrument check. Second-guessing the checkpilot can be one of the most subtle and dangerous of aviation's unforgiving elements – the same ones that my friend, the old pilot, warned me about. Consider:

- A senior lieutenant, himself a checkpilot, talks about what might be given in the way of simulated emergencies when he flies a NATOPS check. "But," he adds, "everyone has his own favorite gimmicks, and you will get to know not only who does what, but also how he does it. You'll learn; you'd be surprised at what I could make happen in this aircraft." Does he mean that one will learn to compensate for each checkpilot's inventive methods? "Well," he answers, "you **always** have to play the game by someone's rules." This is said with a nebulous smile.

- An experienced pilot briefs the following: "In the event of an aircraft emergency, whether actual or simulated, I will take whatever initial immediate action is required, in accordance with NATOPS emergency procedures." But on a checkflight when he sees an unsafe gear, suddenly drops rotor RPM, or feels a power loss or stuck throttle, just **how much less** is he inclined to believe that the emergency or malfunction is real and simply a function of that checkpilot?

- A petty officer who is a skilled aircrewman, considered reliable and trusted by his pilots, is involved in evaluating an airman's performance on an operational flight. When he notices a malfunction or an other-than-usual situation, is his first reaction that of the proficient first crewman that he is, or is it a question for the aircraft commander. "Did you initiate something back here for him [the airman] that we didn't brief?" (Taken in another perspective, does he just **report** his empirical observations, or does he possibly distract the pilot, who thinks something may indeed be wrong because **he** has a normal cockpit?)

- A checkpilot needs a checkride. Does he have to second-guess his evaluator? Can't it be true that his savvy and knowing all the tricks of the trade can make for an inadvertent complacency? It's an attitude he may not even realize and perhaps for which he cannot compensate even if he's a particularly good, professional aviator.

One could hope to find some stimulus for thought here. No one, of course, whether he is Gramps, NATOPS evaluator, safety officer, readyroom sage, nugget, or pilot under instruction will quite agree with the next man on this issue. It's a thin, subtle point of aviation. It is a point of safety philosophy that is both intangible and affecting; a consideration best reasoned on the ground or in the safety standdown, not in the aircraft during a flightcheck. In the end, agreement may not happen, but discussion is always a good point of departure, simply because each aviator's thought process works in a different way from every other one of his squadronmates. In the safety-conscious and productive world of naval aviation, one more contribution to an increased aircrew awareness could someday mean another life saved. Our goal, after all, is to have a lot more old pilots.

A thorough brief by the checkpilot can eliminate areas of possible confusion during the course of a checkflight. However, in the interests of safety and to derive the greatest benefit from any checkflight, the aircrew should treat (within the limits of the brief and safety) each malfunction as authentic. ◄

Chip light ■ LAND OR

By LT Don R. Newman
RVAW-120

AT 0146, the E-2 launched for the second consecutive shot in a night qual series:

E-2: 012 airborne, be advised I have a chip light on my starboard engine, no secondaries.

CATC: Roger, uh, stand by.

Meanwhile, in Air Ops.

Air Ops: What do you want to do with him?

SDO: Trap him; book says nearest suitable field.

Air Ops: OK, trap 012 this pass.

CATC: 012 cleared for immediate downwind, maintain one thousand two hundred.

E-2: Roger, oh, uh, I cycled the circuit breaker and the light went out. Looks OK now.

CATC: Roger, 012, you're number one to land; turn to 150 and stand by for final controller.

A normal carrier arrestment followed. Maintenance and flight deck control were notified and *prior to any maintenance action,* the next transmission heard in CATC was "012 airborne."

At 0045 another night, on the seventh consecutive night FCLP pass:

E-2: 010 ball, state 4 point 2.

LSO: Roger Ball.

E-2: Let's make this a full stop; I have a port engine chip light on.

LSO: Roger, full stop. I'll get the lights on touchdown.

The aircraft cleared the runway without incident, and during taxi, the following transmissions were heard:

E-2: Paddles, I cycled the circuit breaker and the light went out. I'll just get back in the pattern for a couple of passes and if it comes back, I'll go home.

LSO: We don't recommend that!

DISREGARD

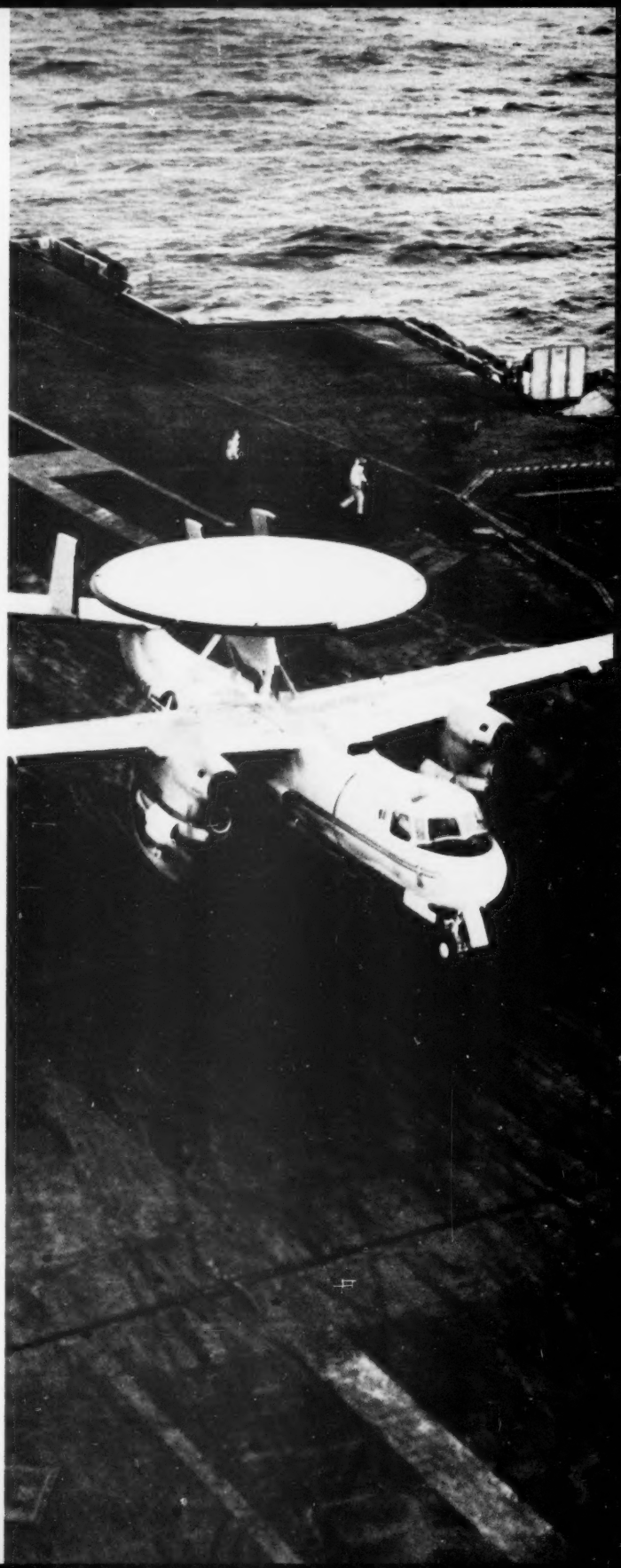
Although the E-2 NATOPS is conspicuously silent regarding recycling the circuit breaker, and implicit in its direction to land at the nearest suitable field, many old hands insistently advocate the recycling procedure. They recant numerous instances of "fuzz" and "broken wires" that would have unnecessarily aborted the mission.

The decision to feather or not to feather while airborne properly belongs to the aircraft commander based upon his assessment of the circumstances. However, the decision to take off after a successful landing following a chip light and prior to any maintenance action is not only in violation of NATOPS, it is also a distortion of intent in pilot prerogative and an abrogation of command responsibility.

Safety officers should thoroughly brief their pilots about the pitfalls of accepting the lore of old hands without some intelligent qualification. The assessment of a time-honored custom should be tempered with the facts. The facts are that for every instance where sensible procedures were modified or circumvented successfully, there is an instance where it has ended catastrophically.

After a lengthy discussion on the radios, the aircraft was eventually shut down to await a maintenance crew. Both of these incidents occurred within 4 weeks. In both instances, the pilots in command initially took the correct and prudent action. What caused them to reconsider and ignore a warning system without a precautionary check?

E-2 aircraft are equipped with a magnetic chip detector system designed to warn of impending reduction gear or engine failure. The system consists of a magnetic sump plug, holding relay, and a caution light in the cockpit. Ferrous particles circulating in the oil stream are attracted and held magnetically to the sump plug, bridging electrical contacts and illuminating the caution light. At the same time, a holding relay is energized, and the light cannot be extinguished until power is removed. A transient particle may activate the light. Verification can only be accomplished with maintenance action. ◄



Survival training involving actual use of survival gear is something usually reserved for Safety Standdowns. However, VQ-3 has expanded it into a regular evolution, which benefits not only the squadron but also our host, NAS Agana. The training program is unique for a fleet squadron; moreover, it shows what can be accomplished with minimal expense when there is sufficient interest and cooperation from other local commands. The concept is readily adaptable to the needs of a variety of squadrons and may therefore be of interest to APPROACH's readers.

This program is the responsibility of the Safety Officer, LCDR T. W. Wilt; however, the credit for the program's creation goes to the squadron Safety Petty Officer, ADC W. M. Caddell, whose imagination and tireless efforts in bringing all the pieces together resulted in its success and continuation.

DWEST revisited

Crew 6 and four SAR swimmers (the people smiling) onboard the bus for the ride to Apra Harbor.

By LT J. E. Doe
VQ-3

MOST Navy flightcrew members have been through some form of DWEST (Deep Water Environmental Survival Training). For pilots and NFOs, the first time is usually at Pensacola. If it's winter, most will not forget that bracing dip in the bay, the taste of the saltwater swallowed, or the quiet contemplation enjoyed in the single-man liferaft. For those who stick around for a second aviation sea tour, the DWEST experience is likely to be repeated, and for those on their way to WESTPAC, the training conducted at North Island – which includes the parachute drag, liferaft, and helo pickup – is a good refresher for the principles first learned at Pensacola.

The *principles*, yes. But how about the SPECIFICS? There are significant differences among the types of survival gear carried on different aircraft, even those within the same general community (e.g., among C-118s, P-3s, and C-130s within the multiengine prop community). Since the Navy cannot afford to set up a separate DWEST for each, this presents a training problem which can only be met economically at the squadron or wing level. It also becomes a good test of the ingenuity of the Safety Department and the support that department enjoys within the command.

One solution to the problem is demonstrated by a survival training program implemented by VQ-3 on Guam. Over a thousand miles from anything much larger than a coral atoll, the squadron must deal almost exclusively with sea survival. Here it's not much like DWEST. There are no

Crewmembers donning LPP-1s aboard the harbor pusher-boat.

parachutes and no helmets; and LPP-1s replace the ubiquitous LPAs. As for rafts, there are two Mk-20s (whatever an EC-130 crew's survival problems, loneliness is not one of them). This equipment is quite appropriate for VQ-3 and its mission of strategic communications, but its limited application within the fleet results in the delegation of responsibility for providing crews with hands-on experience almost entirely to the squadron itself. This squadron's response has been the creation of a mini-DWEST of its own.

The inspiration for this program came while planning a safety standdown for February 1978. It had been suggested that a raft be placed in the NAS pool and that a flightcrew use it for practicing postditching procedures and improving familiarity with EC-130 survival equipment. Well, that idea was hardly new – other squadrons regularly used it, and VQ-3 itself had used it for its *last* safety standdown. What was needed was more realism and scope – perhaps saltwater, smokes, and a real helo pickup!

It sounded a little ambitious at first and perhaps beyond the squadron's capability. However, a little research indicated not only that the project was feasible but also that Guam was the ideal place to try it. At nearby Apra Harbor, the Harbormaster was willing to provide a nice stretch of warm water in the outer harbor – out of the shipping lanes, yet protected by breakwater, and free of

The Mk-20 raft is deployed and secured by its tether. SAR members enter the water and stand by to assist the crewmembers.

Training continues. The crew practices with what it would have following a ditching – including signal mirrors, pyrotechnics, and radios.

SAR personnel ignite smoke flares to give helo pilots the wind.

The helos begin the pickup procedures with a low pass to drop off swimmers. At the end of the line of bobbing heads is a swimmer giving the "thumbs-up."

obstructions to helo ops. He could also provide a pusher-boat for transportation. Not only that, but next door to the squadron was the NAS Agana SAR facility and its two H-1s. The SAR people, it turned out, had training requirements of their own which could be met by the proposed exercise. In any case, they seemed receptive to any variety offered after a succession of routine rescues (mostly swimmers washed off the surrounding reefs).

After exploring the possibilities, the participants got down to briefing the details, especially the helo pickups. Only survival gear actually used by EC-130 crewmembers would be used, and, as has been mentioned, that did not include helmets (there were none available, anyway). Even though the small H-1s posed fewer boarding difficulties than the larger aircraft used in DWEST, the absence of the helmets for the "rescuees" was approved only after careful consideration, since any possible mishap could not be justified by the exigencies of any actual emergency rescue.

As it turned out, mechanical problems – the bane of many best laid plans – forced cancellation of helo participation. However, all other portions of the exercise – raft deployment, survival gear checkout, harbor services – took place without a hitch. In fact, the exercise was so successful that it was decided to repeat it for each crew in the squadron. A monthly scheduling basis was convenient

The helos then climbed to a safe altitude to let out the horse collars and begin actual pickups. A crewmember is hoisted in the horse collar assisted by a swimmer who will protect him during the ascent.

for the SAR facility, whose personnel remained enthusiastic and hopeful for another attempt.

That second chance came a month later. Aboard the bus as it left NAS were a flightcrew, a team of SAR swimmers who would act as instructors, and the survival gear – including the 20-man raft, survival radios, signalling devices, and LPP-1s – all actually carried aboard VQ-3's aircraft.

A half-hour later, the bus arrived at naval station's "mike" pier and delivered its more or less willing passengers to a waiting pusher-boat. Once loaded, the boat shoved off and headed for a prearranged mooring buoy in the outer harbor. The bus, meanwhile, followed along the shoreline (the driver had been briefed to keep the little expedition in sight, until the helos actually showed up) at which time he departed for the helo pad where the rescuees would be deposited.

As the boat tied up to the buoy, SAR personnel conducted instruction in the use of the survival equipment and briefed the exact procedures to be followed in the water. Their enthusiasm, no doubt generated by the self-assurance of experts, was gradually spreading to the flightcrew, whose own enthusiasm had been evident mostly in the absence of outright hostility (the "is-this-trip-really-necessary" attitude of the captive audience). Finally, the raft was deployed and, once inflated, tethered to the buoy and pushed away from the boat. The SAR swimmers entered the water first and stationed themselves in positions to assist the LPP-clad crewmembers who now followed and made their way to the raft.

Instruction continued in the raft as crewmembers practiced using various signalling devices, including mirrors and the smoke flares that would be used to indicate the wind for the aircraft. Using survival radios, SAR personnel established contact with the helos, both of which were then on the way.

The two H-1s arrived and set up an easy racetrack pattern over the harbor while the swimmers and crewmembers paddled away from the raft.

The helos departed their perches and swept in low – in a loose trail formation – to drop swimmers at the end of each line of rescuees. Then, climbing and breaking into two separate racetracks, they returned to commence the graceful and carefully choreographed pickup operation. Using the horse collar, the H-1s would pick up about three crewmembers before departing together to the Orote Point helo pad, where the bus waited. Twice more they returned to resume their aerial *pas de deux*, each move displaying the precision and professional competence of their pilots.

After everyone had been picked up and the helos departed for NAS, the pusher-boat returned to the buoy and retrieved the raft and remaining SAR personnel before making its way back to the pier.

Aboard the bus, the attitude of the crewmembers reflected a new appreciation of the training they had received – not to mention relief that they had survived the helo ride. All in all, they agreed, it had been a pretty worthwhile experience.

The entire operation lasted about 5 hours and involved 25 people, two helicopters, one pusher-boat, and a bus. A modest price, really, considering the invaluable and unique experience provided to all concerned. Eventually, every squadron flightcrew will participate in this mini-DWEST; then, if the drill ever becomes a reality, the equipment, the helo, and quite possibly the very SAR crew will be a welcome and familiar sight. ◄

The message read, "Engine and prop change, inspected torque box and tightened rivets, replaced burned brake discs, replaced port and starboard tires, replaced a small section of aircraft skin near nosewheel door."

OFF THE RUNWAY

AN instructor and a student were flying a T-28 on a day instrument training flight. When it was time to go home, the instructor took control, entered the pattern at Homeplate, and told his student he would shoot a PPEL (practice precautionary emergency landing). The engine hesitated when power was added to clear the engine at low key, and the approach was discontinued due to traffic.

The pilot orbited the field for about 10 minutes awaiting an opportunity to perform another PPEL. Meanwhile, an approaching thunderstorm was causing a wind shift, and tower controllers were about to change the duty runway. They waited to change the runway until those aircraft in the pattern had landed.

The tower approved the instructor's request for a PPEL. The instructor continued normally to a low key with his power pulled back to idle. Again, when power was added to clear the engine, it hesitated. All gages were normal and when the engine once more ran smoothly, the pilot reduced power to idle.

By this time the wind had shifted 180 degrees and was blowing stronger. The instructor kept attempting to correct for a tailwind. When he turned final, he was high and hot. He flared the aircraft to reduce speed and ultimately touched down with 3000 feet remaining halfway down the 6000-foot runway!

He knew all was not going well and put the mixture in idle cutoff to help slow down. He considered taking off again, but decided to stay on the deck and jumped on the binders. He was leery of adding power for a go-around because of the engine's hesitation on two occasions.

It just so happened that the subject of takeoff aborts had been discussed at a recent all-pilot's meeting, so he was well aware of his options. The touchdown speed plus the tailwind was well in excess of the normal landing speed, but the instructor initially decided enough runway remained for a normal rollout. He eased off the brakes to give them a chance to cool and then reapplied them hard. The response was a lot less than he expected.

The end of the runway was getting closer and the instructor knew he was too fast to turn. Mentally he reviewed abort procedures. As the aircraft left the runway, still moving about 40 knots, the gear handle was raised. The nose gear and port main landing gear retracted, the prop dug into the dirt, and the *Trojan* came to a stop on the prop/lower engine cowling/port wing.

The instructor ensured all switches were off, and both pilots exited the aircraft. The hot brakes started a small grass fire, but it was quickly extinguished by the crash crew who had arrived on scene in less than a minute. A crane later lifted the aircraft, the wheels were lowered, and the T-28 was towed to the hangar.

Tower did not advise the instructor of the wind direction and speed, but the instructor heard the tower telling another pilot about a change in the duty runway. No one will argue that wind direction and velocity would have been nice to know. Few will fault the pilot for electing to remain on the deck. However, the pilot's braking technique left lots to be desired. He knew how much runway he would need to stop after an on-speed landing, but apparently the fact that he was hot and had a tailwind didn't increase his pucker factor soon enough after touchdown.

Let's consider two points about this incident. The first is any kind of PRACTICE maneuver. If you should place yourself out of the envelope, then break off the maneuver and try again.

The other point is flying in the proximity of thunderstorms, especially landing or taking off. When there's a thunderstorm near an airport, you can be sure the winds will increase in strength, be gusty, and will change direction. That's the time for real awareness if you're in the pattern. ◄

BRAVO ZULU

LT C. J. Strohofer
ENS Charles Hagan
AMS2 Ronald D. Christenson
ADJ2 Freddy Shephard

LT Strohofer and his crew from HC-16 were making a passenger drop to the USS BIDDLE. While in a hover, above the deck, the HH-46 which they were flying began to lose power. There was an audible winding down and the helicopter began to settle.

As the rotor RPM decayed, AMS2 Christenson and ADJ2 Shephard played out the hoist cable at high speed allowing the passenger in the hoist to reach the deck, jump out of the horse collar, and run clear. LT Strohofer and his copilot, ENS Hagan, noticed that electrical power was lost as the main landing gear of the helo settled into the safety net.

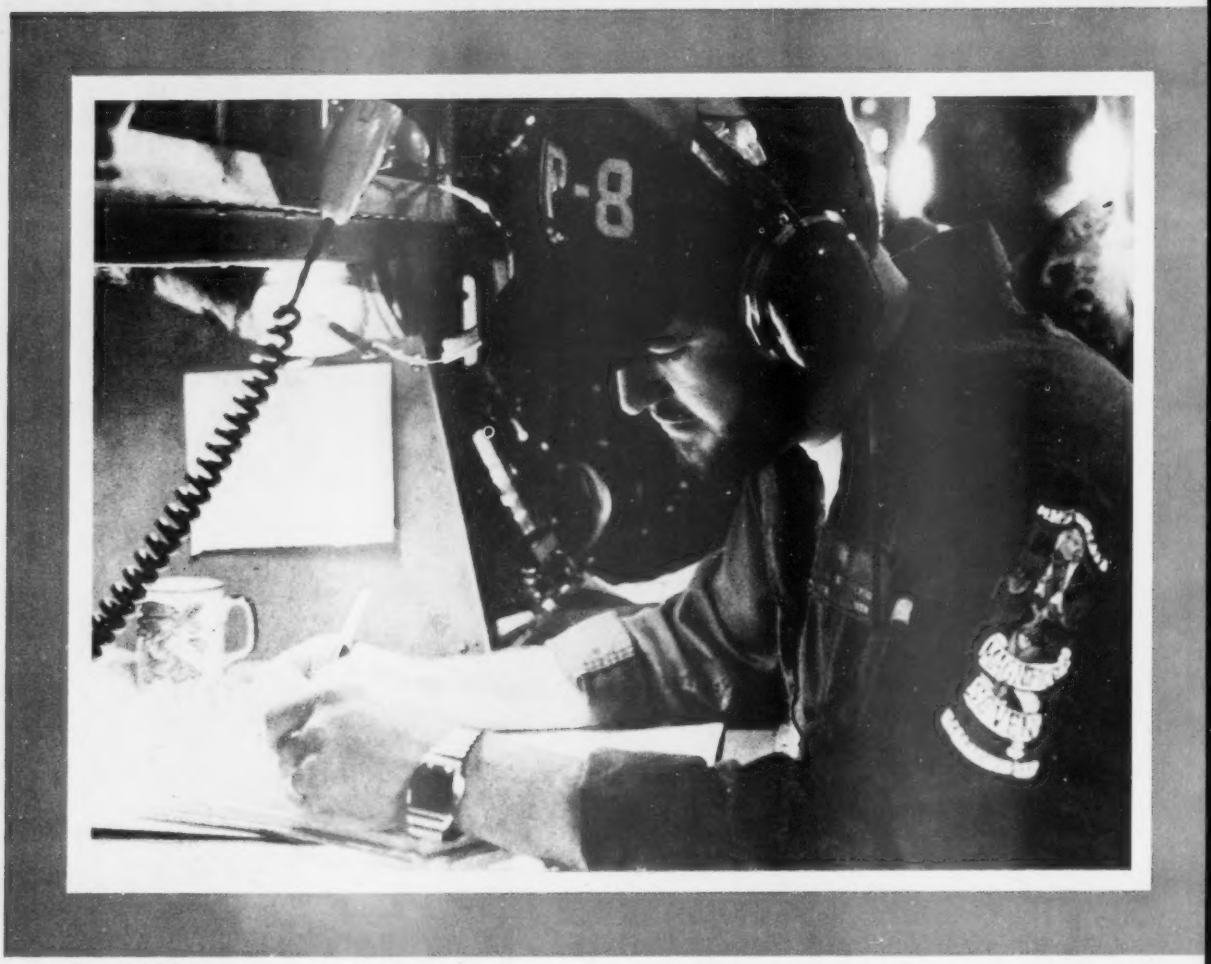
The pilot quickly armed the emergency throttle, depressed beep trim switches, and maintained some control of the HH-46 to slide clear of the ship and into ground effect in the water. The pilot also started the APP which returned electrical power, and as the helo settled into the water, enough RPM was available to fly.

LT Strohofer increased collective, the helo broke clear of the water, and the crew returned safely to their carrier, USS J. F. KENNEDY. Later troubleshooting revealed a fault in the engine condition actuator.

Congratulations to LT Strohofer and his crew for a smooth, professional example of coordination and teamwork in handling a power loss, at high gross weight, in a hover, with a passenger on the hoist, over a deck much too small to land on. Well done!

Left to right: AMS2 Ronald D. Christenson, LT C. J. Strohofer, ADJ2 Freddy Shephard, ENS Charles Hagan

Navigation style -



BASED on three deployments with a P-3A/B squadron, it has occurred to me that four distinct navigator styles exist among fleet P-3 navigators. Initially, one may question the importance of an individual navigator's style – as long as he gets me where I want to go, who cares? Besides, with the P-3's endurance, any error in navigation can easily be corrected, flight violations and unnecessary anxious moments for the crew notwithstanding. Wrong! Apathy about navigation – to any degree – can and has placed a crew in dire peril.

I submit that while flying in unfamiliar areas, on long, overwater transits to and from operational patrols, in heavy weather, and during emergency situations, there exists no room for navigation error. The aforementioned situations are not usually isolated occurrences. They are generally the case vice the exception. To compound the situation, the navigator will usually find that the crew is flying in one of navigation's black holes. The navigator's style can be a

Who cares?

By LT Howard K. Nelson, USN
VP-8 NFO NATOPS

negative factor contributing to the overall pucker factor of the mission, or it can be a positive factor, as shall be explained.

The first navigator style is the *loranigator.* The *loranigator's* nightmare is flying into an area without LORAN coverage. There is no length this navigator will not go to in order to obtain a LORAN fix. Some tricks used by the *loranigator*: plans a track to fly a LORAN line; transposes a LORAN A line to a LORAN C chart or vice versa; and uses rates clearly within the base line extension of a LORAN station. Most loranigators would rather not be bothered with anything as trivial as DR navigation. This navigator is just getting by. Look out for him, he can place you in a bad situation.

The second style of navigation is only marginally better than the previous style. One often hears the *dopplergator* state, "Give me a good doppler and I'll take you anywhere." The obvious response to this statement is what if you don't have a good doppler or what if it fails? The only wind the *dopplergator* is aware of is that which he derives from doppler. Tell him about no winds, track/ground speeds, wind of the water, or in extreme cases, wind star or wind around the corner, and he will generally look at you with disbelieving, incredulous, wide-eyed wonder. The *dopplergator* possesses many of the *loranigator's* traits. He also has the potential to place a crew in peril. However, he will generally only embarrass the crew by being a few miles off course, due to the wind! The first two styles of navigation are characteristic of navigators with longevity in a squadron. Salty navigators are very often associated with the *loranigator* because complacency has insidiously replaced good navigation techniques.

The next navigation style is the *system* navigator. He is characterized by his unfailing trust in the aircraft's navigation systems. He will generally carry a DR plot. However, he does so only to verify his systems, instead of vice versa, which is preferred. This navigator probably believes in Santa and the Easter Bunny as well!

The *systems* navigator is usually a newcomer to the squadron. He does not possess the experience necessary to recognize a marginal system or the self-confidence to trust one of the potentially best navigation systems aboard the P-3 — himself! If not given proper guidance, the *systems* navigator could easily graduate to become a *loranigator* or *dopplergator*. If, however, proper training and interest are afforded him early, he may develop into a member of the last, but not least, navigator category.

The *professional* navigator ascribes to the philosophy that navigation is an art and a science. He is not content to simply leave point A and sometime later arrive somewhere near point B. The professional navigator is a contributing member of the flightcrew during preflight, takeoff, transit, and landing evolutions, and an invaluable member of the tactical crew on station, providing timely suggestions and aid to the tactical coordinator.

He is thoroughly versed in celestial, LORAN, radar, visual, TACAN, VOR, and ADF fixing and will not rely on a single source throughout a flight. He monitors his navigation systems correctly, and if a consistent error rate is noted, the ASN-42 (Inertial Navigation System) and/or the ASA-47 (Doppler/Air Mass Computer) may be used for a good DR position in the absence of other fixing information.

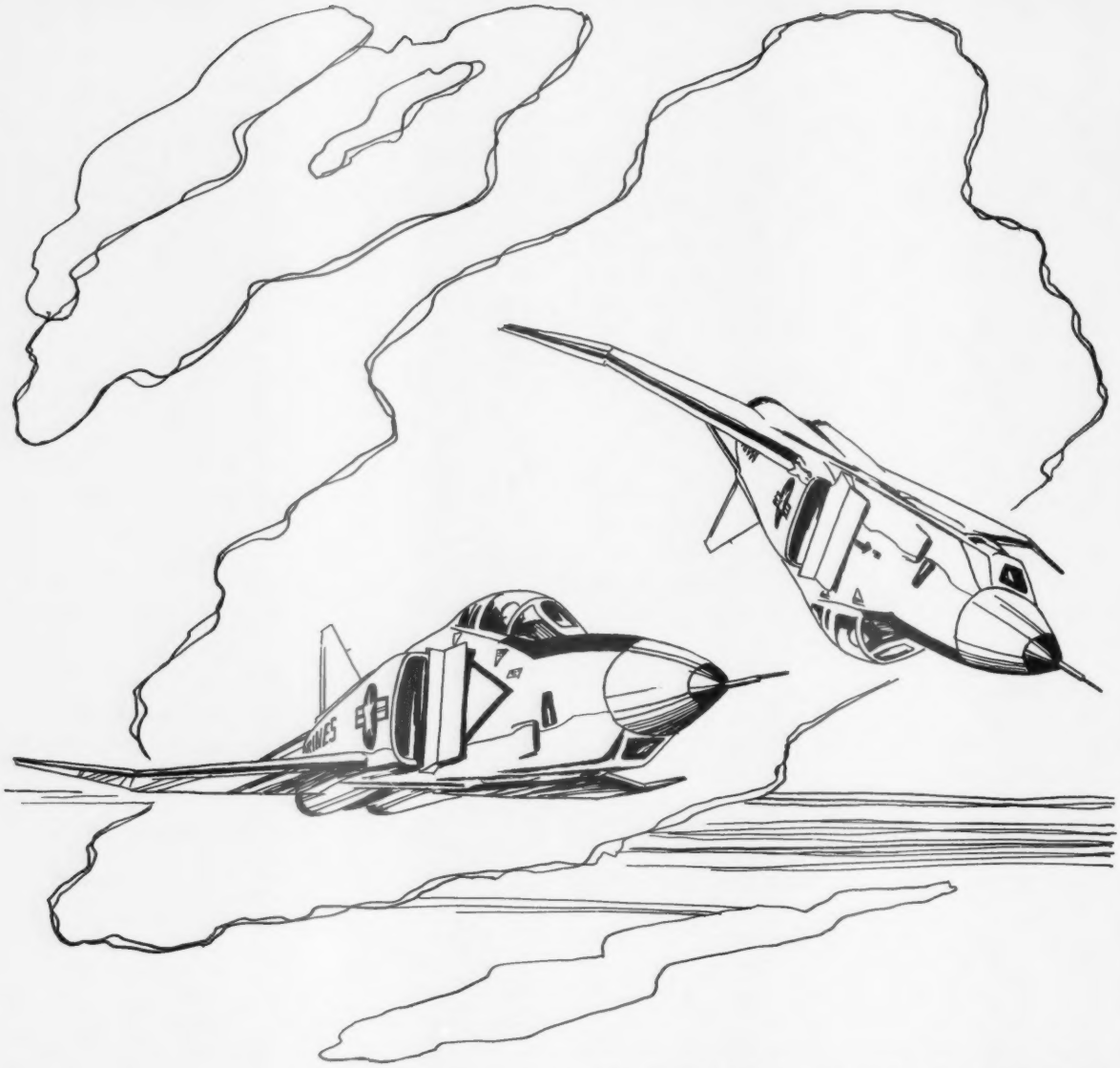
Several wind computations are always available to the *professional* navigator. The wind computations mentioned in the *dopplergator* description earlier are available as well as doppler drift angle/ground speed, and ASN-42 inertial drift angle/ground speed. Several wind computations are generally performed at each fix, compared, and the most reasonable one utilized.

He continues to cross-check his navigation systems throughout the flight, and takes frequent fixes as opposed to the three previous style navigators mentioned. They take a fix once an hour whether needed or not. The professional navigator is always ahead of the aircraft and never cuts corners for the sake of convenience.

The point is that the *professional* navigator will always be actively involved in all flight evolutions, performing his duties effectively and efficiently with a positive mental attitude and pride in the fact that he is performing to the limits of his capability.

The navigation styles delineated have never been formally recognized or informally verbalized. However, they are clearly apparent in the trust and confidence a crew places in their navigator.

What is your navigation style?



CANOPY ROLL
to disaster

THE canopy roll is a maneuver that is relatively easy to perform and has probably been done by most tactical aviators at one time or another in their flying career. However, it has virtually no tactical value, it is not taught in any approved syllabus, and it *has* resulted in many near-misses and dangerous situations. In this accident, an inexperienced pilot, flying a heavily loaded aircraft, apparently attempted to canopy roll at low altitude. The result was a tragedy: one aircraft destroyed and two fliers killed.

The accident occurred following takeoff on the ninth leg of an extended cross-country flight. The two RF-4s had been on an approved R03N to give the junior pilot some

The pilot had never exhibited any tendency toward flathatting or otherwise undisciplined behavior in the past.

instrument time, cross-country experience, and extra flight hours. The flight had been routine and uneventful up to this point, with no significant discrepancies on the aircraft.

Dash 2 rolled with about a 10-second interval on lead and executed a running rendezvous. Lead had stabilized at 3000 feet (1700 feet AGL) and 340 KIAS. Shortly after joining, the wingman rolled left over the lead aircraft. Witnesses recalled that the pilot had little elevation above the lead either before or during the roll. The wingman sliced down to the left of the lead, passing through the lead's altitude 80-90 degrees right wing down, 30-40 degrees nose low, descending rapidly. Shortly thereafter, the aircraft appeared to enter an accelerated stall and departed controlled flight. The out-of-control aircraft impacted the ground in a nearly flat attitude. The RSO (reconnaissance systems operator) initiated ejection just before impact, but it was too late. Neither ejection seat left the aircraft, and both aircrew were fatally injured.

At the estimated joinup speed of 340 KIAS, the *Phantom* had a maximum instantaneous G of +4.5. Therefore, the aircraft was not recoverable from the attitude it was in when it passed through lead's altitude.

The recovered aircraft parts failed to reveal any malfunctions that might have caused an uncommanded roll. Nor was there any evidence that the flight leader encouraged – or would have tolerated – such a foolhardy maneuver.

The pilot had never exhibited any tendency toward flathatting or otherwise undisciplined behavior in the past. He was, however, an inexperienced pilot with only about 400 total hours and 130 hours in F-4s (112 in RF-4s). Since he was ordered to photo F-4s, he received only an abbreviated familiarization syllabus in the replacement training squadron. This meant that he was given no training or had no experience in F-4 maneuvering and tactics. It is likely that the pilot attempted a maneuver beyond his experience and ability level.

Interestingly, this accident may not have been a unique case. Of the past eight RF-4 accidents, seven have been pilot-induced stall/departure type mishaps occurring at low altitude!

What's more, the average total time of the pilots was about 450 hours, and the average time in model was less than 100. This would indicate that the pilots coming into the RF-4 program might have lacked the training in basic aircraft maneuvering.

A related problem was the entire squadron's lack of knowledge concerning the aerodynamics of a situation such as the pilot found himself in. An informal survey within the squadron revealed that the majority of aircrewmembers were not immediately aware that the accident aircraft was not recoverable given its parameters as it passed the lead aircraft following the abortive canopy roll.

A better understanding of aerodynamics and more experience in maneuvering the RF-4 may well have prevented this accident. The question that remains unanswered, however, is why any pilot – who was regarded as a conscientious, "straight arrow" aviator – would attempt a foolish maneuver such as this in the first place. The answer will never be positively known, but it appears logical that the exuberance of a successful cross-country flight on a beautiful day in a "going machine" all combined to cloud the young pilot's judgment.

It was recommended that pilots coming into the RF-4 community receive more indoctrination in tactical maneuvering of the F-4 and increased indoctrination in aerodynamics in a formal training environment. The traditional explanation for the abbreviated syllabus had been that the Service could not afford the extra expense involved in tactics training for F-4 pilots not going to fighter squadrons. As one person commenting on the accident put it, after seven RF-4 stall/spin accidents, he didn't see how the Service could *not* afford to provide the extra instruction.

This accident should also cause flight instructors in all areas of training to reevaluate the example they set during a student's formidable years. Surely this young F-4 pilot didn't invent the canopy roll himself. In all probability, somewhere in his training, he had heard of or seen someone he respected and admired perform a canopy roll. This explicit or tacit approval of the maneuver undoubtedly was a factor in his attempt. Flight instructors must remember that what is a simple maneuver for them may not be simple for someone of lesser experience. And anything they do is likely to be emulated. Particularly in a formal training environment, if a maneuver isn't necessary and it isn't in the syllabus, don't do it. ◄

SPEAK TO ME

THE crew of a C-1A finished their preflight, strapped in, and taxied out to the duty runway. The pilots noticed nothing unusual. After copying their clearance, they took off for Stop 1. The aircraft commander flew the first leg, and on arrival, shot a normal approach and landing.

Their time on the ground was short. They had enough time to offload a couple of pieces of cargo, swap a passenger or two, and conduct a walkaround. They fired up for the second leg with the copilot in the left seat. As they taxied out, the aircraft seemed to be dragging a bit. The aircraft commander thought the copilot was riding the brakes, and the copilot thought the aircraft commander was riding the brakes. Neither one said anything to the other.

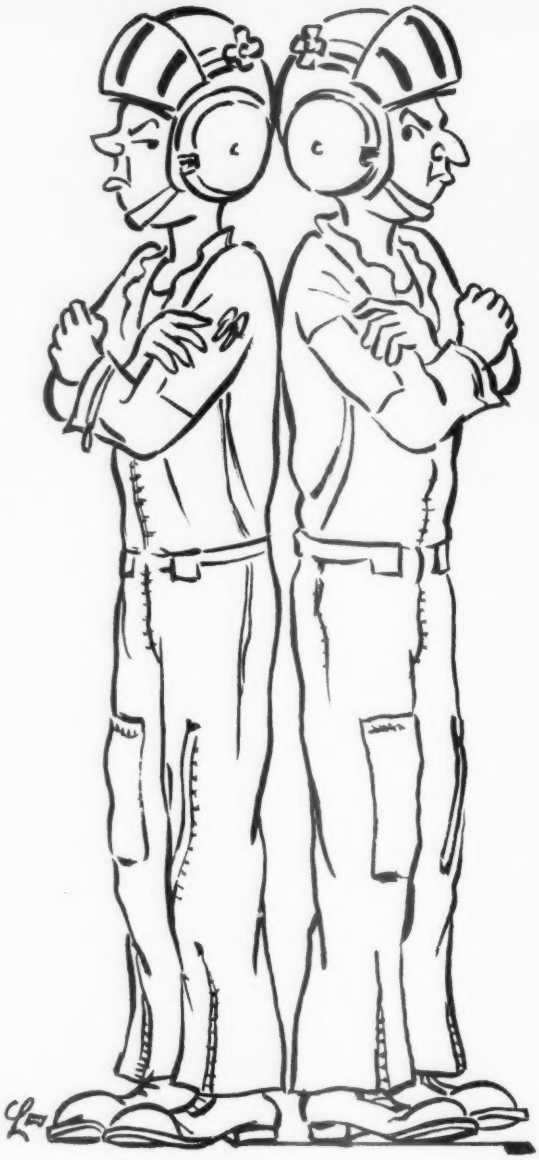
The copilot started a takeoff, and after initially rolling straight, the aircraft veered toward the right side of the runway. The copilot thought the aircraft commander had engaged the rudder assist. The aircraft commander thought the copilot had momentarily lost it. They didn't speak.

They took off, climbed out, and during the third leg the aircraft commander commented on the preceding takeoff. The copilot asked about the engagement of rudder assist and was advised the system had been activated prior to the roll. They reached Stop 2, and the copilot made a normal landing and rollout. However, during taxi to the parking area, once again the aircraft seemed to drag. The aircraft commander thought the copilot was indecisive about where to park and was using excessive power and riding the brakes. The copilot thought the aircraft commander was on the brakes again. No words were exchanged.

They remained on deck for 3 hours at Stop 2. During that time, the copilot took extra care to inspect the mainmounts, but didn't see anything unusual. For the next leg, the pilots swapped seats. During taxi, both pilots felt unusual vibrations for about 10 seconds. However, the vibrations smoothed out, the aircraft commander dismissed them as rough surface vibes, and continued taxiing. The takeoff was uneventful, and they headed for Stop 3. On arrival, the landing and rollout felt normal.

As they taxied toward the ramp, excessive power on the starboard engine was necessary to maintain a straight line. They had to leave the concrete and taxi across some steel matting. When they reached the steel matting, the starboard wheel locked. They shut down in place and discovered the starboard main landing gear wheel cocked on the axle and the hub too hot to touch.

Maintenance personnel found that the wheel inner bearing assembly had failed. It was necessary to replace both assemblies. The disc on the inner wheel bearing had seized on the axle and could not be removed. The complete strut assembly had to be replaced. It is suspected that the lack of bearing lube occurred due to introduction of water and aircraft cleaning compound during a 14-day inspection wash job.



A local MRC to regrease the bearing after a washdown had been rescinded even though the C-1 has a history of main landing gear bearing failures.

In this incident, it wouldn't have hurt a bit for the aircraft commander and copilot to have discussed the problems and iron out who was doing what to whom. ◄

NOT VERY PROFESSIONAL

I was the OOD when I received a phone call from a Navy pilot at a neighboring Air Force Base. He was the copilot of an S-3A which had landed, but was denied permission to RON. He was anxious to obtain permission to land on our airfield and RON. I explained that at the hour he would arrive, there would be no transient line services nor would there be any on the day he wished to leave (Sunday). He assured me that no line services would be necessary and that he would see to securing his own aircraft for the weekend. Before he hung up I cautioned him that our runways were only 5000 feet long. He said that 5000 feet was just fine.

One hour later, the aircraft arrived (nighttime). Immediately, the station crash trucks had to roll because the S-3A's brakes had overheated. After spending half an hour at the end of the runway with portable fans directed on the brakes, the aircraft taxied up to the transient line and shut down. I asked the first pilot out of the aircraft if he was the aircraft commander. He hesitated, then answered that even though he signed the "A" sheet, the other pilot was senior and probably was the aircraft commander. I then asked him if S-3s normally operated on 5000-foot runways. He replied that the S-3A was a great little plane and could stop in 2500 feet "no sweat." I looked at the torn and shredded starboard tire and marveled at the shortfield capability of the S-3A. I was also impressed with how the pilot stood beside the hot wheel to inspect it instead of standing forward or aft of the tire.

Next, the aircraft commander stepped out of the aircraft and went back to inspect the tire. He reaffirmed that the S-3A is a great STOL bird, even when landing with 9000 pounds of fuel onboard. I then asked why they were turned away from the Air Force Base and was told that the place was PPR for the weekend. What had happened was that their squadron had just finished participating in an air wing weapons deployment and that they, with two other pilots, had obtained permission for a cross-country to the East Coast. The other two pilots had been let off at another Air Force Base and would be picked up on the return trip. Those two pilots were the ones who had performed the flight planning and filing. They had either failed to check NOTAMs or failed to tell their fellow travelers about the PPR listing at the ultimate destination.

Having finally ended up here, the question now became what to do about their wheel. I told the two pilots that even though the starboard tire was ruined, not to worry because I thought that we had some S-3A tires onboard which could be used in building up a new wheel. All they needed to do was arrive in the morning and request assistance. They said no, the tire looked OK to them, and they would be leaving Sunday as scheduled. I assured them it would be no problem (I am the Organizational Maintenance Officer), but they said the tire was OK.

Well, they didn't leave Sunday, nor was the tire OK. On the following Tuesday, while my Maintenance Control Chief was trying to convince them to take time to change the tire and they were insisting it was OK, the tire settled the discussion by going flat and demanding to be changed.

As far as I know, the flight made the trip home without incident, but I wouldn't have been willing to bet money on it after all that I saw. The story made good telling around here and didn't do much for the S-3 squadron's reputation.

Amazedmouse

Letters

Re "Cargo Load Shifts"

NAS Norfolk – I'm certain that either the (anonymous) author of the June article on "Cargo Load Shifts" really didn't mean what was printed in the first paragraph, or that he was uninformed concerning the missions of such aircraft as the CH-53 which truly "carry the mail" (and everything else under the sun) for numerous units which cannot operate efficiently without this valuable assistance.

As in any aircraft, the name of the game is to know what you are hauling, and ensure that the flightcrew is totally responsive to the limitations of cargo, securing devices, and weight. If this is done routinely and consistently, then our helicopters can indeed operate well within the parameters for which they were designed. On the other hand, if we adhere completely to the axiom of refusing to respond to cargo lifts, we take yet another unnecessary step backwards in the name of "safety" when what we really desire is increased operational readiness, improved response to fleet unit requirements, and strict adherence to well defined aircraft limitations. It not only can be done, but is being done throughout the operating forces on numerous occasions every day. Perhaps the best facet of this program is the fact that it really works, and augments rather than detracts from safety.

CDR S. P. Dunlap
COMNAVAIRLANT Safety

● As you say, " . . . the name of the game is to know what you are hauling . . ." If the aircrew doesn't know what it is hauling, or is unfamiliar with the cargo, or approach the maneuver haphazardly, the proper precautions will not be taken. Such cargo is better left behind.

Re "The Breaks Without Brakes"

FPO, New York – The article "The Breaks Without Brakes" in the MAY '78 issue seemed to be conclusive and correct except for one statement which stated that the flaps should be blown down and then the gear blown down in an actual emergency situation. In order to set the record straight, the following is quoted from NATOPS:

"When utilizing the emergency extension system, the landing gear should always be extended prior to extension of the flaps. If performed in reverse, a failure of the check valve in the emergency landing accumulator charging line will preclude landing gear extension."

Although the error has probably been discovered by you or someone else, the above is respectfully submitted "just in case."

LTJG Darrell Smith
VA-86

P-3 Landing Gear and Checklist Responsibility

NAS Pt. Mugu – After reading CDR Gulliver's "Revelations of Rush Hour Traffic" (or "Chop-Prop-Drop") in the JUN '78 APPROACH, I'd also like to make a few comments.

I've always wondered why the copilot on the P-3 aircraft has been assigned the responsibility of reading and therefore ensuring that all checklists are completed.

Most unintentional gear-up passes and landings have been caused by distractions which break normal habit patterns. These distractions, more often than not, come from outside the aircraft. Under these conditions, both the pilot and copilot are

equally distracted by other traffic and/or increased UHF/VHF communications. Other traffic and UHF/VHF communications usually do not require any immediate action or response from the flight engineer, and therefore his normal habit patterns are least likely to be adversely affected.

I therefore believe that the P-3 flight engineer should be given the responsibility of reading the Climb, Descent, Approach and Landing checklists. From the standpoint of landing gear, the flight engineer then represents one more line of defense concerning a checklist item that is called for by the pilot and acted upon by the copilot. From the standpoint of outside lookout during the departure and arrival phases of flight, the copilot is in a much better position to observe other traffic than the flight engineer and should therefore be free of the responsibility of reading checklists.

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, Naval Safety Center, NAS Norfolk, VA 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

Adoption of this suggestion would make the flight engineer responsible for reading all normal checklists in flight except Loiter, Shutdown, and Restart. I do not suggest that the flight engineer be required to read any emergency checklists nor that he be responsible for reading any checklists on the ground.

The number of attendees at P-3 NATOPS conferences is now quite limited. Additionally, there always seems to be a marked resistance to change. If my letter could be published in APPROACH, I'm sure it would generate interest, and since I feel quite strongly concerning my suggestion, I'd be most interested in hearing arguments from those who are opposed.

LCDR William Rakowski
VP-65

Re: "Thunderstorms"

FPO, New York – I read with great interest your article on thunderstorms in the JUN '78 APPROACH. Your figures for the years 1973 through 1977 are most interesting and, I am sure, are accurate with regard to inescapable, reportable incidents in which death, injury, or damage *which could not be covered up* was reported.

However, in my 18 years of flying, I have personally been involved in no less than four thunderstorm incidents which could have been reported but weren't reported because they "would make the squadron look bad and, besides, no damage or injury occurred."

Two of these eventually resulted in my being faulted for bad judgment and downgraded in fitness. The first occurred on returning from a mission on the West Coast.

After departing NAS North Island at about 0900 and completing mission operations in the Phoenix area, including a refueling stop and some 5 hours on station, our flight proceeded east. Constant weather checks and updating on the progress of thunderstorm activity in the vicinity of our flight route and at our primary refueling stop, Cannon AFB, resulted in the decision to proceed on our alternate route to Bergstrom AFB. Heavy thunderstorms west of Bergstrom were skirted and a landing was effected safely about 1 hour prior to the arrival of the storm at Bergstrom.

As we arrived at base Operations, severe wind/rain conditions were being set and refueling operations were suspended. After some discussion concerning the weather with the forecasters, and a close examination of weather conditions between Bergstrom and NAS Jacksonville, it was determined that we would wait until morning to return home. The factors leading to this flightcrew decision were:

- We had originally briefed our flight that morning at 0800, and our landing at Bergstrom had occurred about 1700.
- We would not be able to depart Bergstrom before 2000 at the earliest.
- The line of thunderstorms we had skirted was now east of Bergstrom, a solid line with tops above 30,000 feet.
- There were numerous other areas of similar weather north and south from Memphis to the Gulf of Mexico.
- It was nighttime.
- It had been a long, hard working day.
- The squadron duty officer indicated no operational requirement for the aircraft.

We refueled, secured the aircraft, got a good night's sleep, and departed at about 0700 the next morning. Our return to Homeplate was without incident. On our return, the commanding officer called the pilot and severely berated him for poor judgment, lack of aggressive airmanship, and a "chicken, liberty-hound" attitude. The executive officer said about the same thing to me, the navigator. The above rationale fell on deaf ears!

The second incident, some 6 years later, found me in the position of senior officer present for a flight of three from Norfolk to San Diego. Our original flight plan called for an early morning departure with a refueling stop at Oklahoma City. After a 3-hour maintenance delay, the flight departed with reduced fuel loads and a revised en route stop at Little Rock AFB.

An en route weather check approaching Memphis indicated heavy thunderstorm activity at Little Rock and forecast to continue for at least 1 hour. Since none of the A-3s in the flight had NATOPS-required fuel for extensive loiter time in the Little Rock area, we decided to refuel at NAS Memphis and continue. This we did. After a series of other decisions concerning en route weather, runway crosswind conditions and temperatures, and numbers of flights per crew, per day, in accordance with NATOPS, we arrived a day late at our destination but in plenty of time to meet all operational commitments.

Again, I was berated for unaggressive, poor judgment in not pressing on to our original en route refueling stop despite the actual weather report, not a forecast. These two instances, along with several other hairy tales of thunderstorm occurrences, like the time we lost 10,000 feet in 30 seconds and had ice buildups on the wings up to 3-4 inches while penetrating the soft spots, were absorbed by many officers who were JOs then and are senior officers now.

I wonder what decision they will make despite your excellent, factual, but, in the eyes of some, conservative approach to thunderstorm scare tactics! Safety reports are great, ONLY if they HAVE to be made and ONLY if they do not "make the squadron look bad" or detract from the can-do, press on, aggressive operational performance!

As a former safety officer, I can truthfully say we ought to practice safety, not just preach it and write about it as Monday Morning quarterbacks.

Name Withheld

Re: "The Hazard of Hydroplaning"

Alexandria, VA – This is to call your attention to an error in the article "The Hazard of Hydroplaning" which was authored by myself and appeared in the JUL '78 issue of APPROACH. The expression for total dynamic hydroplaning should read:

$$Vc = 9\sqrt{p}$$

I believe this will now make more sense to your readers. For example, the ground speed at which an F-4 may experience total dynamic hydroplaning would be approximately 156 knots – not 2700!

Michael P. Jones, Specialist
Airfield Pavements and Soils
Naval Facilities Engineering Command

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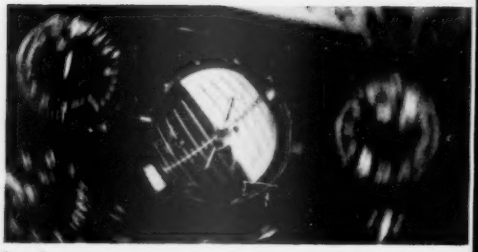

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CREDITS/Staff artist Blake Rader drew this month's cover depicting the H-3 *Sea King*. The *Sea King* joined the Fleet in the early 1960s. Since its introduction, this versatile helicopter has performed a variety of missions including antisubmarine warfare, cargo hauling, and Search and Air Rescue. Pg. 8 Photos, VF-121; Pg. 13, 17 Photos, courtesy Grumman Aircraft Corp.; Pg. 23 Photo, HC-16; Pg. 18-21 Photos, VQ-1; Pg. 24 Photo, VP-8.

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Some months back, according to an informal report to the Naval Safety Center, an employee in an NAS cafeteria choked on food lodged in her throat. A person familiar with the Heimlich Maneuver rushed to her aid and possibly prevented a fatality. The following article about the Heimlich Maneuver is reprinted from the March/April 1975 NAVY LIFELINE.

THE HEIMLICH MANEUVER

THE "Heimlich Maneuver" could save your life.

What is it?

It's a technique to keep people who have inhaled a chunk of food instead of swallowing it from choking to death. (See "Cafe Coronary," NAVY LIFELINE, May-June 1974.) In such cases, laymen must treat the victim immediately. There's no time to summon professional aid.

Choking on food and other substances caught in the throat is said to be the fifth major cause of accidental death in this country. Many people die from inhaling food because they don't get the right treatment in time. Often, companions think the victim has had a heart attack. The chunk of food which blocks the windpipe also blocks the voice box, and the victim can't talk, even when conscious. Untreated, he or she dies from lack of oxygen in a few minutes.

The Heimlich Maneuver was developed by the Cincinnati surgeon for whom it's named. Reportedly, it works this way:

You stand behind the victim and put your arms around the waist or just above the belt line. Then, grasping one of your own wrists firmly, you squeeze hard repeatedly and rapidly, pressing your locked forearms into the victim's upper abdomen, allowing the victim to slump forward with head and arms dangling. This sudden pressure applied below the diaphragm compresses the trapped residual air in the lungs, and the food mass is forcefully ejected. (Only during inhalation can a chunk of food go the wrong way. The chunk traps a certain amount of air in the lungs. When the air is compressed by the Heimlich Maneuver, the food pops up and out "like a cork from a bottle of champagne.")

Dr. Heimlich points out that the same principle may be applied to the unconscious victim. Place the victim on his back. Facing the victim, kneel astride his hips. With one of your hands on top of the other, place the heel of your bottom hand on his abdomen slightly above the navel and below his rib cage. Press forcefully into his abdomen with a quick upward thrust. Repeat this several times if necessary.

If you choke while alone, you should do anything you can to apply sharp force just below your diaphragm, such as falling into the edge of a table or sink. The objective is to compress your upper abdomen in order to pop the obstruction loose, Dr. Heimlich emphasizes.

ONE GOOD REASON TO CHECK YOUR FLIGHT DECK GEAR